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21 January 1970

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NO. 2

MEMORANDUM FOR: Computer Science Advisor, OCS

SUBJECT : Procurement of a COMCET 60

1. A variety of studies have been conducted in OCS on time-sharing systems for use in CIA. Currently, a 360-67 Time-Sharing Computer with forty (40) terminals is installed and operational. The use of this system and the build-up of workload has so far exceeded expectations. Further, the number of additional terminals requested is much greater than was projected for the first year. Total projections for the 1971-to-1973 time period is now estimated at 200 to 300.

2. The Time-Sharing System was envisioned, planned, and installed to handle primarily interactive services of file keeping, editing, and query. The power and flexibility of the system provided an ideal tool for computer program development and debugging. The rapid response, quick turnaround, and ease of use has resulted in a vastly improved service to computer programmers. The volume of program development and debugging work, particularly with large scientific programs, was unanticipated.

3. At the request of a few users, APL-360 was added to the system. APL-360 has a "desk calculator" capability, and it was anticipated that the system would be used for this purpose. The APL language has a very powerful "number cruncher" capability, and the more sophisticated user rapidly learns to manipulate his matrix and statistical problems. This use is expanding as the word spreads. This provides the user with almost unlimited computer power at his fingertips.

4. The result of the rapidly increased use of the Time-Sharing System and the number of unanticipated, large scientific and

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mathematical programs has resulted in a bottleneck. The actual job-mix on the System has resulted in slow response to the interactive user for whom the System was originally installed. The tremendous improvement in program development time (estimated 3/1) precludes discontinuance of the scientific and mathematical service. The service must be improved without destroying the user's ability or prerogative of "doing his job".

5. The quickest method of providing immediate improvement to the Time-Sharing System is to provide a link to the 360/65 so program compilations and "number crunching" programs can be transferred from the 360/67. This would provide improved interactive service to all users and still provide the improved service to the scientific program development. The IBM 2360-3 selector channels with the channel-to-channel adaptors (feature code 1850) would provide the hardware at a minimum purchase cost of \$163,200. Major software development in both Operating Systems (CP and OS) would be required. This still would not provide the expanded terminal capability to reach the projected 160 (or more) additional users in the next two years. The terminal devices and control units will cost (Attachment A) approximately \$350,000.

6. Another method of providing a solution to the problem would be by procuring a communications processor. OCS has studied processors manufactured by IBM, Honeywell, Univac, Interdata, SANDAC, and COMCET. The IBM equipment will not be available until late 1970. All other equipment except COMCET has a too limited capability to be of use to OCS. COMCET was studied in depth, and the conclusion reached that with the exception of software interface to CP-CMS System on the Time-Sharing computer, all other hardware and software features were compatible with the needs of OCS. The software interface to OS (360/65) is available. The COMCET company is willing to provide two skilled programmers to develop the CP/CMS software interface on a joint-development basis. The basic system has the expansion capability required to handle the terminal service device requested from OCS. The basic processor with all devices to support the current forty (40) terminal Time-Sharing System would cost \$326,700. The expansion

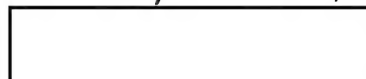
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to 200 terminals would cost approximately \$770,000 (see Attachment B), for a total cost of \$1,104,480. One 2702 (\$46,175) would be surplus to current needs. The net cost difference to procure the device based on projected needs (1971-1973) is \$17,280. This would provide a device with extensive additional capability for expansion and a complete mix of terminal device support capability.

7. Procurement of the COMCET processor at this time would help solve the immediate OCS Time-Sharing problems and provide the time to develop software required for future OCS Time-Sharing workload. In addition, the system will provide an activity monitor, which is an item being studied for procurement at an estimated \$35,000 cost (Attachment A).

8. Recommend that a contract be written with COMCET for a COMCET 60 communications processor. This contract should provide for four to six month lease (\$11,000 per month) with a 90% purchase option. The rental and purchase should be contingent upon the development of the necessary software to properly interface with the OCS 360/65 and 360/67 systems under OS and CP-CMS.

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Attachments: a/s

Attachment A

EQUIPMENT LIST COSTS

1	2860-3 with two 1850's		\$163,200
1	2848-3 Display Control	\$ 18,530	
4	3357 Disp. Adapter @\$3,880	15,520	
1	3857 Expansion Unit	1,890	
	4787 Line Addressing @\$450	3,600	
	TOTAL 2848-3		39,540
8	2260 Display Unit @\$970	7,760	
8	4766 Alph-Nu Keyboard @\$20	160	
	TOTAL 2260		7,920
5	2702-1 Control Unit @ \$39,580	187,900	
31	4635 Line Adapter @ \$1,085	33,635	
1	7935 Term Exp	950	
1	7955 Lin Exp	4,560	
	TOTAL 2702		125,045
152	2741 Terminals @\$4,050	615,600	
	152 4635 @\$135	20,520	
	152 8341 @\$225	34,200	
	TOTAL 2741		670,320
TOTAL TERMINAL EQUIPMENT COSTS			\$1,006,025
TIME SHARING ACTIVITY MONITOR (Estimated)			\$ 35,000
TOTAL PROJECTED EQUIPMENT COST			\$1,041,025

Attachment B

1	COMCET 60 Processor	\$326,700	
152	Asynchronous Line Adapters @\$300	45,600	
2	COMCET 10 @ \$7,200	14,400	
	TOTAL PROJECTED COMCET EQUIPMENT		\$ 386,700
152	2741 Terminals @ \$4,410	\$670,320	
1	2848-3 Control Unit	39,540	
8	2260 Display Unit	7,920	
	TOTAL PROJECTED IBM EQUIPMENT		717,780
	TOTAL 1971-1973 TERMINAL EQUIPMENT		\$1,104,480

26 January 1970

MEMORANDUM FOR: Acting Director of Computer Services

SUBJECT : Procurement of a COMCET 60

1. This memo recommends that a contract be written with COMCET, Inc. for lease (with purchase option contingent upon specified software and hardware performance) of a COMCET 60 communications processor at a purchase cost of \$326,700. Attached is a paper by [] giving details of configurations and costs.

2. The most significant change in the next several years in how computers service Agency needs will be in the distribution of "hands-on" facilities to the customer areas. Computer services in a very real sense are at last evolving into the long promised interactive era. The 40 terminals already installed represent several kinds; but the technical thrust of the future is to have many diverse types, some exotic and yet unspecified, at the analysts fingertips. There is nearly unanimous agreement among computer professionals that communication processors are essential to serious implementation of future interactive services. Internal studies strongly support this view. All large commercial interactive services companies are acquiring or have acquired communications processors. Many companies with large internal interactive systems also are moving to the communication processor concept.

3. The technology level of existing communication processor hardware differs widely. Originally, manufacturers built hardware control units to perform the interfaces between the computer and the terminal. Any minor change in terminal or usage requirements required design, price negotiation, special hardware, and a long delay in installation. The dynamics of the interactive services precludes this method of operation. The fixed hardware devices now used have been a key factor in many of the past delays in the CCS implementation of full interactive services.

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4. The most significant advantage in using a programmable interface rather than hard-wired hardware is that of software management and the resultant much better utilization of money and humans. This factor is often overlooked but in the future will be critical; in fact, already OCS has expended more IBM 360/67 resources in the programming of interfaces than the total communications processor system costs. Savings versus expenses will be increasingly more dramatic. It does not make sense to develop new interfaces on the large computer. Not only is the interface much more complex, with unwarranted implementation delays, but the cost of the machine is at least \$1,000 per hour, and most important, dozens (hundreds over time) of analysts are deprived of their basic research tool, the interactive computer service. Proper planning of development on a communications processor which is designed for ease of interface will produce more timely implementation with minimal interruption to analysts at trivial machine cost. It is emphasized that this probably will be a dominant consideration in whether OCS provides good or inadequate interactive computer services in the future.

5. Very few machines which are used as communications processors were originally designed for this use. Several manufacturers have taken standard computers, added several extra instructions, and built special communications interfaces, and then have called this a communications processor. For example, the largest computer manufacturer, IBM, has modified an IBM 360/44 into what is known as the PTI (Programmable Terminal Interface). It appears to be very inflexible in that it has software only for IBM produced terminals, and seemingly was hastily contrived to re-enter IBM in a competitive marketing position. Other manufacturers, such as Honeywell, have built good CP's but have not had the vision to design for future large capacity requirements. Several small hardware companies have built excellent CP's but have developed no software. One of these, Scientific Control Corporation, which builds the beautiful and inexpensive SCC-4700 has now filed bankruptcy. Several small software companies have anticipated the future and have selected a small general purpose computer, have developed software, and market the system. Most of these companies are oriented to grab the current market, but do not have the resources to grow with the future. Several of these companies have excellent

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products and very state-of-the-art technology, e. g., one has the excellent general purpose Interdata Computer which has microprogramming capability. This company has micro-programmed the CP interface into an excellent total system package, but again no plans are apparent for beyond 1970. One company, COMCET, appears to have the long term vision, and has planned accordingly. It was formed by many of the best communications hardware engineers and software technicians from UNIVAC, which has generally been acknowledged as the communications hardware leader among major computer manufacturers. It has been well capitalized, it has designs for large communications processors for the future, and has successfully installed several of the largest state-of-the-art systems in the country.

6. The Agency management may tend to reject the CP concept in that each one is yet another computer added to the Agency inventory. Unfortunately, this is true; but there is no choice. Surface dollar costs are comparable for both the present hard-wired interfaces and the programmable interfaces (CP's). The cost balance can tip either way, depending on how the equipment is configured. The potential future savings in using CP's are great, and technically the choice is clear for the future. Management should accept this concept of additional computers for the communication interfaces and ignore arbitrary definition of what is "yet another computer".

7. OCS must connect its large processors, the IBM 360/65's, together for more effective load balancing. Also, some jobs are run more efficiently on one machine than on another (such as Mod 67 vs. Mod 65). The CP will provide the most effective method for these dynamic interconnections. Again, standard interface from the regular processor to the CP will avoid much of the debug times and cost to implement the direct cross connections.

8. COMCET, Inc. as a company is relatively new. This has made the choice difficult. It is easier to recommend going with a company such as IBM, since the recommendation of a well established company seemingly indicates the recommender if the purchased product turns out to have been inferior. However,

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the COMCET Company has generated in the evaluations confidence that this choice is best for the Agency. The choice was further complicated, since the special market for CP's is wide open. Nearly every week another company announces its "world's best" communications processor. Much time has been spent since April 1969 studying the concept and the various systems. A reason can always be found to study the next new machine just announced, and there will be probably another dozen or so CP's announced before year end. A great many of the engineering patents pertaining to computer communication interfaces are held by COMCET technicians (developed while working for their former employer, UNIVAC), and it is felt that COMCET will continue to produce advanced CP's.

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9. The successful implementation of the CP approach will require adequate staffing. The total concept must be designed and decisions must be made on such philosophical questions as whether or not graphic display rolling is powered by the CP or by the central computer. Standards must be documented for complete future flexibility. The role of the CP in regard to automata security must be determined. A task team of five high-level system programmers seems reasonable--one to design and coordinate the tasks, two to develop the special non-standard IBM 360/67 interface, and two for general tasking. This level is contingent upon acquiring the two systems programmers free of charge from COMCET as mentioned in the proposal. It is impossible to speculate intelligently as to the staffing requirements after the first 18 months.

Computer Science Advisor, OCS

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Attachment: a/s